CONCRETE PIPE CULVERTS, DRAINS, AND SEWERS

ITEM 1210

WORK INCLUDED: (Sec. 01) Furnish all labor, materials and equipment and properly install reinforced and non-reinforced concrete pipe and fittings as shown on the Drawings and specified herein.

REFERENCE ITEMS: (Sec. 02) Items of work and/or materials to be performed and/or furnished and included for payment in this Item are:

Granular Backfill	
Earth Excavation and Backfill	
Testing of Pipe Lines and Sewers	
Sheeting and Timbering (LIP)	Indefinite

Applicable portions of the latest revision of the following specifications shall be included as a part of these specifications:

ASTM American Society for Testing and Materials
ODOT Ohio Department of Transportation

MATERIALS: (Sec. 03) Non-Reinforced Concrete Pipe shall conform to the specification for concrete Sewer, Storm Drain and Culvert Pipe, ASTM Designation C-14. Maximum size shall be eighteen inches.

Reinforced Concrete Pipe shall conform to the specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe, ASTM Designation C76.

Concrete Wall Pieces shall be fabricated in accordance with the layout requirements.

Each pipe length shall have tongue and grooved ends formed on machined rings to insure accurate joint surfaces. Diameters of tongue and grooved surfaces shall not vary from the theoretical diameters by more than one sixteenth (1/16) inch. All reinforced concrete pipe shall be supplied in minimum lengths of six feet.

Pipe using the "O" ring type joint shall be similarly formed but with a specially reinforced bell end. The reinforcing shall be adequate to meet all tensile stresses in the concrete caused by compressing the rubber "O" ring. Joints shall conform to ASTM C443.

Reinforced Concrete Elliptical Pipe shall comply in all respects with ASTM Designation C507, and shall be horizontal elliptical (HE) or vertical elliptical (VE) of the class indicated on the Drawings or in the proposal. Lining for concrete pipe used in sanitary, or intercepting sewers, and when specified on the Drawings, shall be factory lined with a high-

build, polyamide-cured, 2-Component coal tar epoxy coating, Military Specification, MIL-P23236. The lining compound shall be sprayed to obtain a continuous and relatively uniform and smooth lining with a minimum dry film thickness of 0.03 inches.

The entire interior of the pipe, the interior and end of the bell and the outside and end of the tongue shall be coated. Surfaces to be coated shall be brushed with a stiff broom or brush and then air blown to remove all dust, dirt, loose sand and latent. No surface shall be coated until all grease, oil and other contaminants are entirely removed. All pipe shall be thoroughly dry before applying coating.

Lining is not required for storm drains.

Bedding material shall be gravel, crushed limestone or slag, No. 6, 67 or 68 gradation per table 703-1 of the ODOT Specifications, free from dirt and other deleterious materials.

INSTALLATION: (Sec.04) Methods of handling, unloading, cutting and joining pipe shall be in accordance with the manufacturer's recommendations.

Pipe, fittings and specials shall be installed in accordance with the American Concrete Pipe Association.

Pipe, fittings and specials shall be carefully examined by the Contractor and Resident Representative for defects just before laying. No pipe or fittings shall be used which is known to be defective. Pipe and fittings shall be thoroughly cleaned before being laid.

Excavation and backfill shall be done as specified in the applicable Item for excavation and backfill and within the measurement limits shown on the Drawings, except as modified by the section covering "Additional Authorized Excavation" in the Item for Earth Excavation and Backfill.

Pipe shall be laid in well compacted bedding material, placed on undisturbed earth or well compacted foundation material. Pipe shall be uniformly supported throughout its length except for the bell holes required for the proper installation of the joints. The ends or shoulder of each pipe shall abut against the adjacent pipe in such manner that there will be not unevenness along the inverts.

No pipe shall be laid in water or on frozen trench bottom, or when in the opinion of the Resident Representative the trench conditions or the weather are unsuitable for such work.

Pipe delivered for the installation shall be strung as to minimize the entrance of foreign material. At the end of the day, and at such other times that work is not in progress, all openings in the pipeline shall be plugged. Joints of all pipe in the trench shall be completed before work is stopped. If water accumulates in the trench, the plugs shall remain in place until the trench is dewatered.

Pipe larger than 18 inches shall be "homed" by using a winch and held in place with this

equipment until the succeeding length of pipe has been properly bedded and is in position to be jointed.

The Contractor shall use a laser beam for establishing line and grade. The method used shall be as recommended by the manufacturer of the laser equipment and must be satisfactory to the Resident Representative. The laser beam shall not be of greater power than 2.5 milliwatts (0.0025). The continual visual check shall be provided by the laser equipment. The Resident Representative will provide reference points for line and grade in sufficient numbers to make possible the efficient use of the laser beam equipment.

The Contractor shall not deviate from the required line or grade without the written consent of the Consulting Engineer.

No pipe shall be laid until a sufficient length of trench has been properly prepared to permit laying at least one standard length of pipe at one time.

Immediately before laying pipe using rubber gaskets, the gasket on the tongue of the pipe and the inside of the groove of the bell shall be thoroughly cleaned and coated with rubber cement, in accordance with the gasket manufacturer's recommendation. The pipe shall be lined up and the tongue end of the pipe forced into the grooved end of the previously laid pipe. The inside space shall be constant at all points, and shall not exceed 3/16" to 1/4" when the joint is completed.

Whenever the standard type joint is used, the pipe bell shall be given a coat of Primer before applying any joint compound. The lower half of the bell end shall be filled with joint compound and an oakum or jute gasket of proper thickness shall be embedded in the compound. This gasket shall be about nine inches long and shall act as a spacer, to facilitate the invert line of the pipe being laid coinciding with that of the pipe previously placed in position. After the pipe being laid is pushed "home" the entire annular space shall be filled with compound and pointed up so as to be smooth. The exterior of the joint shall be thoroughly filled, and, if pipe with a bell is used, the small annular space is furnished, the jute or oakum space may be omitted if such omission is approved by the Resident Representative. After any piece of pipe is in its permanent position, care shall be taken to prevent its movement. In case any movement takes place, the joint shall be checked and re-caulked if necessary.

Lifting holes shall not be permitted.

JOINTS: (Sec.05) Concrete pipe shall have either Premium or Standard type joints, as specified and called for on the Drawings or in the proposal.

Premium Type Joints shall be used on all sanitary or intercepting sewers, and on relief or other sewers, if specified. Premium joints shall be made with rubber gaskets, hex seal, Tylox, O-Ring, or equal. The type of joint shall be approved by the Consulting Engineer prior to the placing of the order for pipe by the Contractor.

Gaskets shall be made of special composition rubber in accordance with ASTM Designation C443 with smooth surfaces free from all imperfections which shall assure a permanent, watertight seal. Gasket rubber shall meet the physical test requirements of ASTM C443.

The rubber gaskets shall be installed in accordance with the manufacturer's recommendations.

Standard Type Joints shall be made with bituminous products thoroughly mixed with asbestos and other mineral matter to a homogenous consistency which shall have a flash point of 345^0 F. minimum, and shall not crack at a temperature of -10^0 F. The manufacturer's instructions shall be followed in using the material.

SPECIAL PIPE: (Sec.06) Curves whenever required shall be made using beveled pipe, in accordance with the curve data shown on the Drawings.

Provisions shall be made for placing of house service connection stubs, etc., in the location shown on the Drawings, or where required. A precast hole into which a stub is grouted in place with non-shrinking grout (Embeco or equal) after the pipe has been laid, shall be provided at such locations, and of such size as shown on the Drawings or required to receive house service connections and connections from intersecting sewers. Stubs for pipe from intersecting sewers larger than eight inches in diameter shall enter the new sewer at an angle of 45 degrees with the centerline of the new sewer. Entering the sewer and the edges of the opening shall be made smooth. Entering stubs shall be fully supported during and after being grouted in place. The joint of all entering stubs larger than eight inches in diameter shall be encased in concrete. No stub larger than twenty-four (24) inches in diameter shall be inserted into a precast pipe. All larger connections shall be made at junction chambers.

All special shaped pipe, such as angle pipes, radius pipes, pipe with openings or slant stubs for pipe connections as shown on the Drawings or required shall be provided and payment included in the unit price for the pipe. Lining will be required for all specials when used with lined sewer pipe.

All stubs shall be plugged unless connected to branch sewers or house connections.

CONCRETE CRADLE, ARCH OR ENCASEMENT: (Sec. 07) Concrete used to encase or support the pipe shall be paid for under the Concrete Item. Concrete used for the encasement of vertical drop pipes, tees and ells associated with drop manholes, and for encasement of service stacks shall be included with the respective Item.

Wherever Type A (Concrete) bedding or arch is used instead of granular material due to exceeding the measurement limits of the trench, no payment will be made for the concrete used. Concrete shall be as specified in the Item for Concrete. Care shall be taken to prevent flotation of the pipe. All Type A bedding shall be placed on undisturbed earth or

well compacted backfill.

WYES, STACKS, SERVICE SEWER, AND RECOMMENDATIONS: (Sec.08) Y branches, service stacks and house service sewers shall be 6 inches in diameter unless specifically shown or called for as a different size.

Each Y branch shall consist of furnishing and placing a 45^0 elbow in the main sewer, straight pipe riser, elbow at the top of the stack, stoppers if required, concrete encasement, additional excavation, and location marker. A stack shall be used only when the centerline of the trunk or street sewer is more than four (4) feet below the expected elevation of the house service at the street sewer unless otherwise shown on the Drawings.

Each standard service sewer shall consist of all earth excavation and backfill, granular bedding material, furnishing and installing all straight and curved pipe at the grade determined by the Resident Representative, (0.62% min.) from the Y branch or service stack to the property line, unless otherwise shown on the Drawings, or to the point of re-connection to an existing service sewer. Included shall be all joint materials, adapters if required, stoppers, location markers, testing can clean up.

Re-connection of existing service sewers shall consist of locating the existing service sewers, maintaining flow as required, all required earth excavation and backfill, bedding, disconnection of the existing service sewer from the existing trunk or street sewer, removal of existing service sewer as is necessary, securely plugging the discontinued service sewer when required, providing and installing adapters if connecting different types of pipe, and making a proper connection to the new service sewer.

Y branches, service stacks and service sewer required for the proper completion of a re-connection shall be furnished and installed under this Item.

The location of Y branches and service stacks shall be marked with a one-half inch diameter steel pin, 30 inches long. Ends of service sewers shall be marked by a precast concrete cylinder, 4 inches diameter x 30 inches long, with top flush with the surface of the ground.

Where curbs are available, the location of each service sewer shall be marked by a two inch cross cut into the top of the curb on the side of the street to be served by the service sewer. In all cases the open ends of Y branches, service stacks and pipes shall be securely closed with carefully fitted stoppers which will not move during field testing, and sealed to prevent the entrance of water, earth or other substance into the sewer. Approved plastic stoppers may be used if they fit properly into the bell.

ABANDONING EXISTING SEWERS: (Sec. 09) Where existing sewer lines are encountered during construction and are shown on the Drawings or determined by the Resident Representative to be abandoned, all broken pipe within the excavation limits of the new construction shall be removed to permit proper placement of bedding and new pipe. At locations where the sewer is to be abandoned falls outside of the excavation

limits, broken and cracked pipe shall be removed back to a sound joint where a masonry plug shall be constructed of brick and mortar to completely seal the abandoned sewer from the infiltration of soil and water.

The cost of abandoning existing sewers, including removal of broken and cracked pipe and installing plugs, shall be included in the unit price bid for installing new pipe.

SHOP DRAWINGS: (Sec.10) Submit shop drawings as required of these specifications. Included shall be materials, dimensions, joint details and certification that materials conform to the applicable standards.

FIELD TESTING: (Sec. 11) Upon completion of two manholes spans (approximately 800 feet to 1000 feet) the Contractor shall begin testing the first manhole span approximately 400 feet to 500 feet. Thereafter, testing shall be performed within 1000 feet of the pipe laying.

Test shall be infiltration, exfiltration or low pressure air test in accordance with the Item for Testing of Pipe Lines and Sewers.

CLEAN-UP (Sec. 12) This Item 1210, shall include surface clean-up, including removal of all surplus excavation, pipe, broken concrete, stones, and all miscellaneous debris. Rough grading providing drainage shall be included.

The clean-up and disposal of the cleared materials shall be done as soon as practical after laying of the sewer pipe and as the Resident Representative may direct. However, clean-up work shall not fall behind the pipe laying more than 800 feet. Should the Contractor not keep his clean-up work within the aforementioned distance the Contractor shall be required to cease further pipe laying until such clean-up is accomplished.

MEASUREMENT: (Sec. 13) The number of wye branches for standard service sewers or re-connection of existing service sewers, shall be the number actually installed in the completed work.

The number of service stacks, length of service sewer, or re-connection of existing service sewers, shall be paid for under their respective Items. The length of concrete sewer pipe shall be the total number of lineal feet of each size actually furnished and placed, measured along the axis of the pipe after the pipe has been connected in place. The inside diameter of manholes and the length of special structures shall be deducted. No deductions shall be made for the length of fittings or specials in the sewer line.